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ABSTRACT

This discussion of the issues relating to the integration of computer technology into the educational setting is divided into six major sections: (1) Board of Educations' Commitments to Thorough and Continuing Training Programs in the Area of Computer Technology; (2) Educating the Present Superintendents, Business Administrators, and Decision Makers in Education in the Area of Computer Uses in Education; (3) Including the Area of Technology in the College Course Work of Future Teachers and School Administrators; (4) Political Structure and Decision Makers; (5) Strengths, Weaknesses, Opportunities, and Threats Relating to the Integration of Technology into the Educational Setting; and (6) Plan of Action for Integrating Technology into the Educational Environment. Appended are an outline of recommended goals and objectives for a computer literacy course for teachers, a diagram of the political hierarchy involved in the decision to integrate technology into the educational setting, and a list of interview questions used with decision makers in preparing the fourth section of the paper. (16 references) (GL)

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# Issues Around Integrating Technology Into the Educational Environment

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## Introduction

The issues relating to the integration of technology into our society are many. The educational organization is not excluded. One basic principle remains for change of any kind that relates to or effects a total organization. That principle is comprehensive education on the issue. This paper addresses the issues relating to the integration of computer technology into the educational setting. The paper is written from a stand point of the writer's experience in the field of integrating computer technology supported by current published research relating to this issue.

## Board of Educations' Commitments to Thorough and Continuing Training Programs in the Area of Technology

The rapid pace at which technology is being produced has begun to impact the staff development structure of Boards of Education. Long-range planning and commitment are two of the foremost steps that need to be taken by todays educators. Educators can not escape the uses of technology. The mere presence in our daily lives does not allow this. The presences of technology in the daily lives of today's students coupled with their comfort in using technology are two more reasons why educational agencies need to address the issue of technology.

The annual survey on educational technology shows that none of the 50 states require all teachers to take a computer course (Electronic Learning, 1988). Beginning in 1988 however, four states began to address the need for computer literacy among educators and recommended that teacher certification should include computer literacy. Eleven states do require teachers in public schools to take a computer course to become re-certified (Turner, 1989). McCarthy (1988) strongly suggests that teacher colleges and schools of education offer courses in integrating computers into the curriculum. Two of McCarthy's ten steps to curriculum integration address teacher training.

## Technology in Students' Daily Lives- Present & Future

The students who are entering the classroom today are often times much more computer literate than their teachers. They have grown up with technology and respond to it without intimidation. They will be graduating from high school into a world more dependent on technology for its existence as each day passes. In light of the technological advancements in the past twelve years and the projected advancements in technology, educators must be prepared to cultivate all students for their lives in the technological world in which they will be living. Education in the broad sense has not kept up with these technological advancements. Reflecting only on the kindergartners of the 1989-90 school year who will graduate in the year 2002 when the

world will be much more advanced technologically than we can imagine at this time. These are the students who need to be prepared for their future. Presently these students are being taught by generations of teachers who are intimidated, frightened, unknowledgeable- moderately knowledgeable, angry and overburdened when it comes to technology.

## Restructuring Staff Development

What is needed to prepare our teachers to integrate technology into the educational setting? First, they need to be educated in various aspects relative to the use of technology; (1) what the technology can do for them as educators (referred to in the technology world as "using the technology as a productivity tool"), (2) how to use the technology, in other words how to make it run, (3) how to integrate its uses into their individual classroom environments, (4) how to make technology work for them rather than they working for the technology and (5) how to be wise decision makers when it comes to purchasing and using technology. These needs can not be met in one or two one-hour workshop at the beginning of the school year. They can not be met in any one time format. Technological developments are ongoing, thus the need for keeping current with the changes in technology. The decision makers and administrators of educational facilities have the task before them to restructure their approach to staff development when it comes to technology. An on-going commitment to staff development would require a focus on various areas within the system's structure. Budget, time management, incentives and long-range planning are factors that would be involved in the restructuring of staff development.

Cory (1983) concludes that the full implementation of computer technology in a school system is a much more complex change than the implementation of a new method for teaching reading or even the restructuring of schools from open-space to self-contained. She found that school systems go through four different stages before they fully utilize computers. The four stages are (1) purchase, (2) inadequate training, (3) lack of computer utilization, and (4) retraining. Eliminating some of these stages is the direction in which researchers are focusing.

Several writers (e.g., Olson, 1986, Yeloushan, 1986, Naiman, 1982 and Hunter, 1980) suggested the hiring of a computer coordinator or designating a specialist staff person whose role would be to conduct training sessions for teachers and aids. These sessions would entail demonstrating and teaching the use of the computer and its software, and how to incorporate computer use in the various subject areas. The availability of support personnel was found to be a common factor in successful training and integration of computers in the classroom.

### Time Management

When? Where? For how long? During the school day? After school? Both during and after school? In a the district facility? Off campus? These are just a few of the questions that need to be

answered when preparing for a thorough and continuing training component for technology in a school district. A realistic understanding of the amount of time that is required for staff development in technology is a crucial component of any training plan. Short cutting in this area will only waste money, time and effectiveness in the long run. The writer has found that training programs that do not provide the teachers with a well rounded knowledge base only serve to frustrate them and lead to non-use or ineffective uses of the technology. Establishing a support system and training personnel is only the beginning of the teacher training process. The development of a comprehensive and efficient training program is essential.

Yeloushan (1986) suggests the key components to be, setting specific goals for each training session, separate hardware and software instruction with at least 45 minutes a week to review the concepts presented at the training session. She further states that this review time should be a time when the teachers can give their undivided attention to the task. Lamberic (1984) states a computer is so powerful and so flexible that it can become almost whatever on can imagine it to be. He believes can't imagine its uses if one hasn't had ample time to practice. Therefore, computer availability and practice time are seen as essential.

As Yeloushan found, staff training sessions must have a specific goals accompanied by practice time. She emphasizes that a crash course on the use of the computer and software available serves no constructive purpose and results in rejection of the computer rather than acceptance and integration . The awareness of software content and use is essential for effective use of the computer.

## Incentives

[Teacher] "Why should I have to learn how to use that computer on my own time?" [Administrator] "Because you are a professional, that's why." This is a very familiar, nonproductive conversation that has taken place in several school systems through out the U.S. Learning how to use computers does not have to be a forced activity nor does it have to be presented on a silver platter. The incentive to learn can evolve from realizing the usefulness of the computer or from having the training meet a personal interest or need of the educator. Many educators still relate the computer to having to learning those confusing programming languages with no relevance to enhancing the educational process. It is no secret that technology has intimidated many people. This intimidation becomes intensified for teachers and principals when the school building computer guru enters the faculty room and begins spouting a foreign language relative to computers. The last straw is the sudden presence of one or thirty computers in the building while the rumor is circulating that everyone will be required to use these computers. Another reason for incentives is to serve as a vehicle to get the educator into an environment where the intimidation and misconceptions can be dealt with in a constructive manner. Training needs to

be approached in a giving, non-threatening environment. If perks are not included in the training and teachers are required learn on their own time or have no choice other than to spend their own time struggling to learn this new tool, resentment occurs. If resentment evolves we have placed another block into the successful integration of technology into our schools and lives.

Trainers should not be excluded from the incentives if they are from within the teaching or administrative staff. This group is often the same group who has been innovative in other areas and utilized to the maximum during the school day.

### Budget Allocations

Millions of dollars are being spent every year on the purchase of computer hardware yet minimal time is being spent on structured training efforts. Federal, State, Local and grant funding has been heavily channeled into computer purchases for the past several years. Slowly grant funds are focusing on the staff development side of the technology issue. There is a definite need for school systems to address staff development for technology in their budgets just as they have addressed the purchase of computers.

Staff development does not have to be expensive. Effective planning can result in economical training components. However, the reality is that some funds will be needed and they should be planned for so the training effort can run smoothly. In possibly the most extreme case of cost for training it still would be more costly to let the computers sit unused than to provide the training.

### Long-Range Planning

Long-range planning is a must in order to include all of the above mentioned components of staff development. A plan also serves to solidify the commitment. When developing the plan two aspects need to be included The plan should not only included a long range series of goals and objectives but should also include an ongoing component. This ongoing component would provide for commitment to staff development in concert with the ongoing development of new emerging technology.

## Educating the Present Superintendents, Business Administrators & Decision Makers in Education in the Area of Computer Uses in Education

The role of the educator is changing in this information society. Teachers no longer have all of the answers. They are students themselves in this rapidly changing world. Teachers can however, corner the market on where to find the information needed to broaden ones horizons, to think critically and retrieve the information necessary to produce a productive learning environment. Teachers need t become comfortable with their new role and not feel inadequate

because they do not have the answer to all of the questions. How can a teacher be comfortable saying to his or her student I do not know the answer to that question if the supervisor, administrator is not comfortable with the response and views this as a short coming?

Bernard Gifford, Vice President of Education, Apple Computer Inc., states that "perhaps the most exciting possibility the Information Age presents is the opportunity to begin constructing a "Learning Society" - a society where people are instilled with the skills and motivation to pursue learning throughout their lives"(Gifford, 1989, p.6). He cites the educational environment of interaction among the computer, the teacher and the students together creating and bringing lessons to life as being the kind of environment that educators should strive toward. Examples of these creative lessons are the creation of simulated space labs, model cities and ecological systems. Gifford challenges fellow educators to embrace the task of building a Learning Society.

Administrators and board members also need to be aware of the new role and accept it. Staff development in the area of technology is in much more abundance on the teaching level than on the administrative level. How can we expect the leaders and decision makers of the educational facilities to make effective decisions relative to technology if they are not educated on the issue.

The task of successfully and smoothly integrating the computer is not achieved by teacher participation only. Miller (1987) found that the support and participation of key administrators during teacher training facilitated positive attitudes toward the the task of integrating the computers in the classroom. She further stated that these various support personnel also contributed to a broader knowledge base of how the computer can be used.

The lack of administrative awareness brought about unrealistic expectations of the computer or a resistance to set specific goals for integrating the computer into the curriculum (Olson, 1986). Many teachers found their principals requiring the teaching of computers as a separate subject when the software available was that of a supplemental nature to the subjects being taught in the curriculum.

## Uses in the Curriculum

A basic understanding of the varied uses of computers in the curriculum would provide the decision makers in education with the background needed to make educated decisions relative to computer the purchasing and planning. The demystification of computers and their uses via seminars targeted specifically for school administrators could serve to bring about more effective integration of technology into education.

### Methods of Incorporation into the Curriculum

Awareness of the many uses of technology is the first step of preparing to integrate the technology however the means to this integration is also a key. Following are options relative to this integration of which a decision maker should have an understanding.

(1) the physical environment; classroom use vs. a laboratory setting or the utilization of both settings for specific applications

(2) staffing; technical aids vs teachers in a lab, coordinators, supervisors

(3) types of software packages

(4) training strategies and components

## Applications for Efficient Management

Another area that needs to be addressed when integrating technology into an organization is the management uses of the computer. Classroom management, skill management, curriculum management, building management, district management and office management are all a part of a superintendent work environment. There are several computer programs available that tie all of these components together. There has to be a starting point for these applications. First comes awareness then comes use.

### How to Use the Computer

Just as the teachers need an avenue of relevance to buy into the uses of computers so do the administrators. Learning to use the computer for day to day activities required to run the school district would be a valuable experience for every superintendent and business administrator. The results of an informal survey conducted by the writer at a State technology conference showed that all but one of the computer coordinators in 28 of school districts were serving under superintendents who were computer illiterate. Yet, this population was making the final decision on the technology within the districts. This administrative population is possibly more intimidated by technology than the teaching population when it comes to learning how to use the computer. They are also victims of our information society where they no longer have all of the answers. Often times the superintendents rely on staff persons within the district for theses answers relative to computer uses and purchases. Often times due to the superintendent or business administrator's lack of understanding of the world of technology they rely on the wrong person(s). A clerk in the data center would not be the appropriate person to make decisions of educational software or administrative computing. But, a superintendent might think that because that person uses a computer everyday, he/she is the expert and has all of the answers.

Once the upper level administrators have a successful hands on experience with the computers they have the potential to explore the various applications. Using the computer as a tool to accomplish ones daily activities opens the door to the management applications mentioned above. Their place in the educational organization become clearer to the administrator thus enabling him/her to make more solid decisions relative to computer uses and purchases.

## Staff Roles in the Use of Computers

Because computers aid in making individuals more efficient, users often take on more responsibilities for getting the job done. A part of using computers efficiently is the appropriate use of the total staff. No man or woman should be an island. Because it is much easier for the administrator to produce a finished product on the wordprocessor does not mean that the production of all correspondence from beginning to end should now be handled by the administrator. The clerical staff role does not change. The only change would be that the administrator and secretary would have a more efficient and flexible process to complete the written work and the administrator would have a more time to attend to the administrative duties for which he/she is trained.

Support services in a school district such as the purchasing department, data center, building and grounds department and cafeteria department have the potential to maintain a more effective communication and management relationship with the administrative leaders when the leaders have an understanding of computer applications for these responsibilities. An administrative leader that has a solid understanding of the potential of the computer and its applications has a greater potential to keep the computer working for the system rather than the system working for the computer.

The computer can be used to free teachers from menial paper work and allow them also to exercise the skills for which they were trained; teaching and student interaction. This kind of computer use can only be achieved when the roles of support staff and their contribution to the process of computing is in line with the needs of the teacher. The same process hold true for the exchange and management of information between the administrators and teachers.

The computer can be used to manage, evaluate, organize and store information for the effective running of an educational organization. Each person within that organization must contribute his/her effort to making that organization function. The appropriate staff person executing the use of the computer that is in line with the job level at which he or she is assigned is the only way the computer will serve the organization at an optimum level. Teachers doing clerical duties such as typing data into a computer is on effective use. Typing the data into the computer is clerical. Calling a report from the memory of the computer and reviewing or analyzing this information is a teachers function.

Administrators need to be literate in the delineation of the various roles relative to computer use and enforce this delineation. If not, the computer use can result in more work rather than making the work load a bit lighter and more effective. One missing link in the process will always add more work to the other links, whether using a computer or not using a computer.

## Importance of a Commitment to Thorough and Continuing Training Programs

Effective utilization of staff requires that all staff persons be trained to use the computer for the jobs they are required to do. Perhaps one of the most important components for the upper level administrators to understand is the importance of thorough and continuous training for staff on computer applications relative to their job responsibilities. Oaks (1989) suggests that the ongoing changes relative to technology be viewed as a continuous positive process if we want an accurate reflection of the technological world for students.

The International Council for Computers in Education (ICCE) sees the constant integration of the new computer uses to be of such importance that they adopted a Code of Ethical Conduct (Education Computer News, 1988). The continuous updating and training of teachers is emphasized in the following statement which is one of the commitments that is stated in the code; "To help teachers keep up with current trends, research and literature related to computer developments affecting education."

## Including the Area of Technology in the College Course Work of Future Teachers and School Administrators

Another logical avenue for preparing educators with the technology skills necessary to function progressively in the instructional environment is the colleges and universities that train teachers and administrators.

The majority of the research found has been focused on the training of teachers who are already in their positions. Turner (1989), expounds that teacher training colleges are to blame for the slow movement of the integration of technology into the classroom. She further states that "computer technology will never be used widely in elementary and secondary education unless pupils are taught by precept and example"(Turner, 1989, p.9). The writer agrees with Turner on this point and further believes that technology will never be integrated in an efficient manner unless the teachers are guided and supported by literate administrators. Present and future administrators can be targeted in graduate programs for administrators. The writer is continuing her search for information on graduate schools as well as teacher colleges that address this issue. There are very few to this date. Evidence of graduate courses in computer literacy are popping up, however these

programs are basically graduate course credit and not a part of programs for administrative degrees or certification.

According to the United States Office of Technology and Assessment [OTA] (1988) half of the States neither require or recommend technology preparation for new teachers. Some States however, are establishing guidelines for what technology skills teachers need.

Bratlein (1989) reviewed a nineteen year history of *Computer Development in Educational Administration* finding that the focus of educating future administrators in the utilization of technology was much stronger in the late 1970's and early 1980's than it is presently. The utilization in the administrators' preparation courses took a path of integrating the computer as a tool in the "business procedures and principles" course. Further implementation focused on the use of networks and electronic mail. Over the years the use of the technology evolved to center primarily around manuscript production via wordprocessors thus losing the momentum and overall relevance to administrative work in the educational that was once goal of the department. Although the review of the history of this department covered the utilization of the computer in the curriculum of educational administration the writer recognized that there was a more attention given to the hardware that would be used than the application. This is often the failing point of computer implementation projects.

## Education Relevant Curricula Paths

There is a need for teacher and administrator preparation programs to focus on the areas of technology that are relevant to theses professions. The selection of hardware and software can be the choice of the professional once he/she has become knowledgeable about what the computer applications can do for his/her profession. The first lesson that this group should be presented is that the computer program/application/software should meet their need. The educator should not have to meet the needs of the hardware or the software.

In the writer's experience an adequate technological background from a college level preparation course would include the following components. Future teachers would learn how to use the computer via hands-on experiences with the listed applications. Lecture courses relating the management and staffing aspects of computer integration would also be a part of the study area. See Appendix A for an in-depth view of the hands-on courses the writer would propose for educators.

1. How to use the computer (hands-on)
2. Uses in the curriculum (hands-on)
   a. as a tool
      (1) wordprocessing

(2) database

(3) spreadsheet

b. as a supplement

(1) enrichment

(2) remedial

(3) reinforcement

3. Methods of incorporation into the curriculum
4. Applications for efficient management
5. Cost effective computing
6. Staff roles in the use of computers

The writer's suggested components are in concert with the *General Teaching Competencies in Technology* that are noted in the OTA 1988 *Power On* report. Following are the OTA competencies:

"The teacher should:

1. have an appreciation for using computers as a tool for problem solving;
2. have the experience of using computers in the learning of subject matter;
3. have knowledge of computer vocabulary;
4. be able to use the computer as a tool (using applications such as wordprocessing, spreadsheeting analysis, or database management); and
5. be familiar with computer hardware, including the everyday operation and use of a variety of machines"(p. 101)

It is interesting that the OTS document focuses on the education, competencies and impact of technology relative to teachers and does not directly mention competencies or needs relative to the administrators of these educational institutions who are in fact making the final decisions on the applications as well as purchases related technology.

Teachers and administrators alike are leaders in the educational process. A basic education for our school leaders could clear many misconceptions and put education on the road to a smooth and effective integration of technology into the educational environment.

## Political Structure and Decision Makers

The political structure and decisions makers that affect the integration of technology into education are from four levels, two of which are on a local level. The levels are (1)the United States governmental structure which includes the U.S. Department of Education, (2) the State structures; all of which include a Department of Education, some do not include a division for technology, (3) the local governing body of education i.e the local Board of Education or its complement and, (4) the informal political structure of

decision makers with the school district or university environment. A hierarchical graph illustrating this political structure can be found in Appendix B.

## Local Decision Makers

The local board of education members are elected officials in the school district where the writer is employed. The Board holds the final approval or disapproval power for decision making relative to technology. The Superintendent, Assistant Superintendents and Board Secretary/Business Administrator are the decision makers within the school district before an issue gets to the Board. Proposals are submitted to one of the above for consideration for board approval.

The board of education is made up of community persons who are for the most part aspiring to reach higher political positions and are using the position on the Board as a stepping stone. Six of the nine members definitely have this goal. One person was a former teacher in the district and is motivated to changing some of the dominating political characteristics and focus more on the quality of education. The other two person are parents who were unhappy with the way decisions were being made in the district. The recent change from an appointed board of eduction to an elected board has brought about an upheaval in the district an d everyone is positioning themselves for power.

There is also an informal political network among the Superintendent, Assistant Superintendents and Board Secretary/Business Administrator who are positioning for power. The Superintendent and the Board Secretary/Business Administrator were both vying for the position of Superintendent. Although they are both supposed to be equally powerful in their positions this power fluctuates with the political whims of the Board. These two men are constantly competing for their issues. The Superintendent however does have more leverage in the system because of his alignment with the assistant superintendents and and their alignment with the community/Board.

The colleges and universities that the writer researched do not have a local governing body when it comes to academic decisions however there is an administrative network of persons who are decision makers. The network begins with the instructor and follows through the department supervisor or chairperson on to the dean and finally to the Vice President of Academic Affairs.

## Local Commitment to the Issue

Within the above described political structure the issue of integrating technology is favored by the board members and the administrators. The problem lies in their basic understanding and support of what the integration actually entails. The Assistant Superintendent of Curriculum and Instruction is an avid user/support of technology. He has supported all of the hardware purchasing and has approved some training for the purpose of integration. The problem lies within the depth of his commitment. There is a lack of a willingness to take the step to restructure the approach to staff development.

Profile/Interview of Local Decision Makers

Two key players in the issue of technological integration into the school system where the writer is employed were interviewed. The Board President, a retired educator and the Assistant Superintendent of Curriculum and Instruction under whose supervision the integration of technology takes place were interviewed using a basis of questions that can be found in Appendix C. The Chairperson of the Business Department of the local college was also interviewed. The Chairperson of the Business Department is in charge of the course development regarding **all** computer applications.

K-12 School System Decision Makers

The president of the Board of Education held a strong position on the integration of technology into the educational setting and an extremely strong position on teacher training. She rated the importance of using technology to improve the quality of education in the classroom and in the management of the classroom, school building and district with a rating of "10" (the highest rating) (see Appendix C). She further stated that all teachers should become computer literate and proficient with new technologies. The means to this end, in her opinion is teacher training for all faculty and staff. She was terribly misinformed about the quality and quantity of training that was taking place in the district that she leads. Her responses to the questions indicated that the utilization of technology in the district was at its maximum and that teachers were thoroughly trained. She also believed that there was evaluation documentation to indicate the successful integration of technology.

The Assistant Superintendent of Curriculum and Instruction described his position on the integration of technology as being very progressive. He stated that his district was a state of the art school system where one could find the just about every kind of technology as a result of a recent 3 million dollar purchase that enhanced the existing technological facilities in the district. He further stated that there was not a long range plan in place for this integration. He personally felt that the teachers and staff had received sufficient training and what ever else they might need should be taken on as an interest of their own and they should train themselves. This formal training was a two hour workshop on the areas of how to use the computer, curriculum applications and trouble shooting. The assistant superintendent's plan, if the self training did not prove to be fruitful, was to have the district computer coordinator visit with the 600 teachers individually on their planning time or after school. The visits would entail a one half hour refresher on how to use the computers or equipment and software.

Regarding staffing, the assistant superintendent noted that the persons responsible for technology in the buildings were also responsible for a full teaching schedule and record maintenance of federally funded programs along with his/her technology responsibilities. The time spent on these technology responsibilities was approximately 10 hours per week, 5 hours of which were the teachers' own time

before or after school. On a district level the person responsible for technology is also responsible for three other programs.

Evaluations were not carried out for any of the components of the technology utilization or training. The assistant superintendent felt that he had a clear view of what was and was not working in the district.

### Higher Education Decision Maker

The chairperson of the Business Department on the institution of higher education was interviewed. His position of integrating technology into the education setting was a bit narrow. He felt that education could surely benefit from technology and that education majors at the college were welcome to take the elective courses available in programs and computer application. There were no courses offered for educators and there were no plans to offer any courses. The computer science department which was a subsidiary of the business department was the source of all planning and development regarding computers or technology. All of the instructors on campus used computers for word processing however there was not a method for integrating other uses or relating the uses to their particular fields.

### State Level Political Structure

The head of the political structure for school systems K-12, the Department of Education, of the state in which the writer is focusing is a Commissioner of Education. The unit within this department that addresses technology is the Technology Unit which is a part of the Division of General Academic Affairs. The unit is made up of three persons whose responsibility is to educate school districts on the various methods of incorporating technology into the educational setting.

The structure for the facilities of higher education is the Division of Higher Education. A department of technology is not available in the Division of Higher Education.

### State Commitment to the Issue

There are no specific guidelines or requirements for integrating technology into the schools. The department is set up as a resource of information and guidance. Three regional Educational Technology Training Centers have been established for school districts that wish to use these services.

The lack of a unit or division established in the Division of Higher Education for the integration of technology into the preparation of future teachers says something in itself of the commitment.

### Profile/Interview of State Level Decision Maker

An interview was conducted with the Director of the Division of General Academic. She informed the writer that technology was not a priority of the present Commissioner of Education. Proposed mandated and long range plans for the integration of technology into the structure of the school districts had been put

on hold. The Technology Unit had prepared documentation that could be followed for integration into the education setting.

Teacher training was seen as an important part of this integration however a stance was not taken on the issue. Training and awareness for administrators in the school districts was not a being addressed. Her plans for integrating technology into the educational setting are presently being focused toward integration through the various instructional disciplines. Encouragement for this integration was planned via available workshops and printed guides. The methods and initiative was being left to the individual school districts.

### National Level Political Structure

Presently the House Committee on Education and Labor of the U.S. Congress is taking an interest into the issue of the integration of technology into the educational setting. A request was made by this committee for a study on the potential of interactive learning tools for improving quality of education. The Office of Technology Assessment (OTA) was assigned this responsibility.

### National Commitment to the Issue

The OTA (1988) suggested that the Congress may wish to upgrade the training of teachers overall. Grants and funding targeted for students entering teacher training programs and to support faculty education programs were two areas that the OTA recommended as an upgrade. These two areas were targeted because they were among the four areas that were noted in the study as affecting the forward movement in realizing the potential of technology in education. This study was published only a year and one month ago. Since that time two grants were made available under the Funds for Innovative Education (FIE) which were in the category of the Secretary's Discretionary Grants. The grant title was Innovations in Computer Applications. Guidelines for these funds urged applicants to include teacher training and development components.

### Summary of the Political Structure and Decision Makers

The information gained from the interviews with the decision makers in the position to integrate technology in the field of education supports the writers contention that there needs to be a restructuring of staff development and preparation avenues for the educators of today and tomorrow. The technology is available and the funds are available for the hardware aspect of technology. This is obvious from the physical presence of computers and other technology that is found in the school district and institutions of higher education. What is not in place is structured plan of the integration of technology.

## Strengths, Weaknesses, Opportunities and Threats Relating to the Integration of Technology into the Educational Setting

There are two environments addressed in this paper, (1) the K-12 school system environment, and (2) the environment of the higher education institution. The problem within these two environments is the lack of thorough and effective staff development for the use of computers in the instructional and administrative roles of education. The K-12 school system is impacted by the presence of the technology with inefficient hands-on training and inappropriate delegation of technology related tasks after the training is delivered. The institution of higher education does not include in their teacher preparation courses a means to prepare future teachers or administrators for the use of technology in their career.

Following is a prioritized list of the strengths and weaknesses of the internal environment and the opportunities and threats of the external environment for each of the environs. Table 1 reflects the environ of the K-12 educational component and Table 2 reflects the Higher Education component.

Table 1

**K- 12 School System**

| *Internal Environment* | | *External Environment* | |
|---|---|---|---|
| *Strengths* | Weaknesses | *Opportunities* | Threats |
| Competent Computer Coordinator | Lack of Philosophy | OTA Report /Congressional $ to be made available | $2.5 million spent & training wasn't considered i.e. administration fears of public scrutiny |
| Board President interested in and supportive of staff training | Lack of Strategic Plan | Industry needs computer competent employees | Additional time $ money for staff training on top of 2.5 million |
| Excellent Support from software and hardware vendors | Insufficient human resources assigned to technology staff responsible for integration & training. | State Developed Curr. Guide in progress | Uneducated community relative to tech. integration |
| Core of staff interested in using & learning more about computers | Some resistance to staff & outsider input regarding roles,training and development | Computers have quickly become a part of our everyday lives | |
| Core of staff willing to take computer courses | Teacher burn out and protected by the unions | Large minority population | |
| A wealth of Apple hardware available | Teachers overload- too many responsibilities | Potential for School/College/Industry partnership | |
| Interested Parents | | | |

Table

**Higher Education**

| *Internal Environment* | | *External Environment* | |
|---|---|---|---|
| *Strengths* | Weaknesses | *Opportunities* | Threats |
| Student population interested in computing | Faculty in Computer Science very territorial | OTA Report /Congressional $ to be made available | training wasn't considered i.e. administration fears of public scrutiny |
| Individual Departments supportive of staff training | Insufficient human resources assigned to technology staff responsible for integration & training | Industry needs computer competent employees | Additional time $ money for staff training on top of 2.5 million |
| Software and hardware vendors | Lack of Strategic Plan | State Developed Curr. Guide in progress | Uneducated community relative to tech. integration |
| Core of staff interested in using & learning more about computers | Some resistance to staff & outsider input regarding roles,training and development | Computers have quickly become a part of our everyday lives | |
| Computer labs already in place | | Potential for K-12 School/ College/Industry partnership | |

Internal Environment

Strengths

The two internal environments, a K-12 school system and the higher education institution have some common strengths. The interest in learning how to use the computer and applying it to the educational setting is present. Other shared strengths are the availability of computers and the support from software and hardware vendors. A strength that the K-12 setting has that the higher education facility does not have is a staff person on board whose responsibility is applications of computer in various fields and the facilitation of these applications throughout the various departments.

The strength of the computer coordinator with the support of the Board President are two areas in the K-12 setting that are quite viable for change and implementation. Parent interest added to the in district interest is a factor of support in the political component that if drawn from properly could prove to be prosperous in the issues relating to the effective integration of technology into the educational setting.

The political and academic strength of the student population on the college campus is also an asset in the raising awareness and making progress in the integration.

Weaknesses

The two environments share the weaknesses of insufficient human resources assigned to the technology staff relating to integration and training and the characteristic of resistance to input on the part

of the upper level administrators and decision makers. The needs are being felt by the faculties, students and middle management but the plan,if any, to address these needs are not addressed through this group. Another shared weakness is the lack of a philosophy and strategic plan relative to integrating technology into the various departments and total educational system. Both systems are relying on the overall philosophy of education to cover this aspect.

The higher education institute is suffering from the territorial characteristics of the departments. Each department is addressing the use of computers at the level they comfortable. If the persons within the department are not comfortable or aware of the applications for the department and/or discipline then technology is not addressed. If the faculty member does not have the time or foresight to make technology a part of the discipline the issue of technology is not addressed. The result is teachers graduating into the field of education unprepared to use computers as a tool to their instruction and to their classroom management responsibilities.

## External Environment

### Opportunities

The opportunities are the same for both systems. There is strong support on a State and National level for the issue as shown by the OTA Report and the call for funding to address training and integration plans as well as the State's commitment to the development of an overall curriculum guide. The overall need for thorough and effective training and implementation is reflected by the needs that industry is expressing. Furthermore, the fact that computers and technology are quickly becoming a part of everyone's daily lives in one way or another thus placing the importance of building this aspect into the educational process. These opportunities are supportive to an plans for restructuring staff development or training future teachers and administrators.

### Threats

The threats for both systems seem to fall within the area of upper level administration and the relationship to the community. Politically the scrutinization of monies already spent on computers without sufficient planning and or training is a tremendous threat to this population. The lack of awareness or the public and community involved in the voting to approve budgets and school policy complicates the desire to restructure the educational design to accommodate the needed changes.

## Knowledge Acquired from the Audit and Assessment of the Internal and External Environments

The review of the audit and assessment brought to light the fact that the strengths and opportunities are stronger and greater in number than the weaknesses and threats. This enlightenment makes the task of addressing this issue more resolvable. The delineation of the each component also crystalized the issue enabling a clear cut look at the areas, persons and priorities that will be targeted in a plan of action.

## Plan of Action for Integrating Technology into the Educational Environment

### Introduction to the Plan

The activities, which will be delineated in the Timeline section of this paper are aimed at educating the entire educational system in the uses computer technology, facilitation of these uses and the allocations of necessary funds time and human resources needed to effectively integrating technology into the system. The plan is designed to gain the support of the decision making persons with in the educational structure as well as meeting the needs of the instructors, and students in the environment.

### Problem and Issue

The problem that will be addressed by this plan of action is thorough and efficient training and planing process which has been designed to solidify the commitment of educators to the ongoing process of integrating the uses of technology into the instructional, administrative and business environment of the educational system. The demands that the transition from an industrial society to an information society are strongly felt in the educational arena. This transition has left the educational structure with a tremendous need for retraining of teachers, administrators and support staff. Many new roles need to be established to meet the demand of the technological integration.

### Recommended Action

The recommended action for the integration of technology into the educational setting is a five part process; (1) *Awareness*, (2) *Understanding*, (3) *Commitment*, (4) *Implementation*, and (5) *Ongoing Evaluation*. Each component builds from the previous level to resolve the problems related to the effective utilization of technology in the educational structure.

The first strand of the *Awareness* component consists of calling a meeting with the decision makers in the local public school system, the state college, representatives from the Apple Computer Corporation, representatives from the Education Foundation and representatives from local industry to discuss the issue of technology in the educational environment and to present research data on the issue. A proposal to adopt the plan of action will be introduced. The persons involved in this meeting were chosen from the analysis of strengths and opportunities earlier in this paper. The representatives from private industry are the key players in the awareness component because they have the potential to hold the attention of the decision makers because of their public and financial status. They are also very interested in this issue and in supporting the development of a long-range plan and commitment to the integration of technology. Another key aspect of this first strand of the *Awareness* component is to have press coverage on the meeting. By having this coverage on the mere fact the the issue of technology is being discussed, brings the parents of the public school students into the plan. Press coverage also informs the staff of these facilities of "the opening of the door" to an area they have been individually pursing and an opportunity to express support of further discussion on the issue.

The second strand of the *Awareness* component would pull in the above mentions public and computer staff by introducing the plan via monthly meetings. The issue will be placed on the agenda as an

information item. Information regarding the date, time and location of the board and trustee meetings where this issue will be discussed will be made available. A notation of public input being welcome will be emphasized.

The strands of the *Awareness* component are predominantly political in structure. The purpose of this focus evolved, once again, from the audit and assessment of the internal and external environments' opportunities and strengths. The problem of lack of support and lack of awareness on the part of the decisions makers in these educational environments relative to how crucial this issue is to education is countered by a stronger political structure that does support and is aware of the needs relative to this issue. Thus the heavy political focus in the *Awareness* strands.

The second component in the recommended action is the development of an *Understanding* of exactly what is needed to address this issue. To meet this need the decision makers will be given a series of lecture/hands-on seminars aimed at developing a basic understanding of the many applications of computers and the time, staff and commitment necessary to effectively implement this undertaking. The sessions will give an overview in the sense of administrative literacy. The hands-on component is planned to give these high- level persons a feeling of competence and understanding of the technology not only in the administrative component but also in the applications component. Thus, enabling them to have a concrete grasp on integrating the technology.

The Commitment, the third component in the recommended action is the stabilizing force in the entire plan. The Awareness and Understanding components made a basis for the Commitment. The *Commitment* in this plan is the passing of a three year plan by the board of education and the board of trustees for the training and on-going evaluation of the integration of technology into the educational structures. This *Commitment* includes a restructuring of staff development in regards to time, method of presentation as well as policy relative to school property being loaned to faculty. The financial commitment to this training and staff development is addressed relative to a ratio between the hardware and software that are already in the district and future purchases. The commitment will guarantee that with the purchase of new hardware and/or software comes thorough training and implementation procedures as designated by the computer coordinator, software developers and staff to whom the training will be given.

The second strand of the Commitment component is the development of the actual schedule and budget for the restructuring and implementation of the training. The design of the schedule will include monitoring of the implementation process as well as the development of materials for the evaluation process.

The fourth component, *Implementation*, will address the actual process in action. All staff development and training workshops will be executed during this time. Monitoring and the fifth component, *Evaluation* will also take place during the *Implementation*. The Implementation will be an on-going process that will be initiated and re-initiated as the need is shown from the on-going evaluations and needs assessments.

The *Evaluation* process will take place at various points within the *Implementation* process as well as at the end of the process. Surveys, communication meetings and requests for training will all be considered when planning for re-initiation of the *Implementation* and *Evaluation* components.

## Resources Required

The resources required for the plan include human resources, technological resources, the physical facilities and the funding resources. The systems that the plan is designed for are in need of human resources more than any other resource. The human resource in this plan is also the most important aspect and has been the one resource that has been most neglected in the process previously.

### Human Resources

The human resources needed include two coordinators, one for each facility, three trainers for each facility and two technicians for each system. A secretary for each coordinator that is trained in how to use computer technology and aware of the various uses with in the educational environment is necessary for the plan to be managed efficiently. These roles will have to be established. Each environment has personnel on board who could handle these responsibilities. The reassigning of roles will take place in the *Commitment* component.

### Technological Resources

The hardware and software which make up the technological resources are already in place in both environments. The human resources mentioned above in the technicians' role will have the responsibility of maintaining these technological elements.

### Facilities/Physical Environment

The facilities and physical environments which include the buildings, classrooms, and computer labs are also in place. The responsibility of scheduling of their use will continue to be the building principals and department chairpersons. This scheduling will be done among the coordinators, the building principals and department chairpersons.

### Fiscal

The fiscal responsibilities include printing materials and salary increase. The completion of each training session will earn a staff member 2 salary credits. If the salary credits received from training places a staff person in another salary category an increase in salary will result in an obligation by the educational institution to fund this increase. This is a built in variable in the budget process as it stands therefore there is no need to plan and submit a budget for the projected salary increases. Printing materials for the in training, evaluation and monitoring process will result in a 1% increase in the current operating budget of the computer related programs

## The Timeline

| Activity | Timeframe | Person(s) Responsible | Evaluative Information |
|---|---|---|---|
| Make calls to establish a convenient meeting date -persons to be called:District Superintendent, Business Administrator, Board Members College, President, Dean of Academic Affairs Education Department Chair, Ed Foundations CEO Local Industry Liaison Person, Apple Computer Rep. | February 1, 1990 | District Computer Coordinator | Daily Log |
| Reserve room at meeting location | February 7, 1990 | District Computer Coordinator | Daily Log |
| Send Meeting Notices to Above Persons | February 9, 1990 | District Computer Coordinator | Copies of letters |
| Invite representative from the Press | February 9, 1990 | District Computer Coordinator | |
| Conduct meeting with above listed persons | February 28, 1990 | District Computer Coordinator | Agenda, Attendance Record Notes from meeting |
| Contact all Building Principals, & Dept. Chairperson regarding the issue being placed on monthly meeting agenda | March 1, 1990 | District Computer Coordinator | |
| Attend all building & department meetings | March 1990 | District Computer Coordinator<br>Dean of Academic Affairs<br>Dept. of Education Chair | Agenda from meeting |
| Schedule Hands-on Seminars for Administrators | April 1990 | District Computer Coordinator | Hard copy of Schedule |
| Conduct Seminars for administrators | May, June July | District Computer Coordinator | Outline of content & Seminar evaluation forms |
| Prepare formal proposal for Board Approval of ***Commitment*** | April & May 1990 | District Computer Coordinator<br>Superintendent of schools<br>College President<br>Dean of Academic Affairs | The Proposal |
| Present Proposal to each Board | May 1990 | District Computer Coordinator<br>Superintendent of schools<br>College President<br>Dean of Academic Affairs | |
| Announce Commitment in newspapers, radio & system news | June 20,1990 | District Computer Coordinator | |
| Reorganize Staff for new roles as a part of the technology staff | June 21-30 1990 | District Computer Coordinator<br>Department Chair of Education | |
| Train new Technology Staff | July 1990 | District Computer Coordinator<br>Department Chair of Education | Evaluation forms |
| Develop Training Schedule | July, August 1990 | District Computer Coordinator<br>Dept. Chair of Education | The schedule<br>Evaluation forms |

**Timeline Continued**

| Activity | Timeframe | Person(s) Responsible | Evaluative Information |
|---|---|---|---|
| Introduce the Plan & Schedule | September 1990 | District Computer Coordinator<br>Superintendent of schools<br>College President<br>Dean of Academic Affairs | |
| Implement Training in District & on Campus | September 1990-June 1991 | District Computer Coordinator | Evaluation forms for each session |
| Mid Year Input & Evaluation Forum Plan | January 1991 | District Computer Coordinator<br>Building & Department Resource Persons, Dean of Academic Affairs<br>Dept. Chair of Education | |
| Monitor Evaluations participants informal comments & requests | September 1990 June 1991 | District Computer Coordinator<br>Building & Department Resource Persons | Completed evaluations<br>Suggestion Forums |
| Revise & or modify Implementation Plan | July 1991 | District Computer Coordinator<br>Building & Department Resource Persons, Dean of Academic Affairs<br>Dept. Chair of Education | |
| Develop plan for Technology Awareness & Refresher | August 1991 | District Computer Coordinator<br>Building & Department Resource Persons, Dean of Academic Affairs<br>Dept. Chair of Education | |
| Introduce new plan or schedule for technology awareness & refresher | September 1991 | District Computer Coordinator<br>Building & Department Resource Persons, Dean of Academic Affairs<br>Dept. Chair of Education | |

## Conclusion

The education of the entire educational system in the uses computer technology, facilitation of these uses and the necessary funds time and human resources needed to effectively integrating technology into the system is a major accomplish that will sustain its benefits throughout this technological age. Restructuring of staff, educating and training in the how to and uses of technology is the basis for a successful and efficient educational structure for the 1990's and 2000's. The built in ongoing evaluation, revision and awareness components within the plan sets the stage for these educational facilities to keep current with new uses of technology.

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# Appendix A

New teachers in todays educational market are faced with the challenge of incorporating computers into their daily lessons and responsibilities. Teachers presently employed are also faced with the same challenge. Many teachers as well as other professionals in our society do not have the skills to execute the use of a computer productively. Employers in some cases are making a skeletal effort to introduce teachers to technology, however, rarely is the effort comprehensive in nature.

## I. NEED

There is a need for a structured, comprehensive approach to educate persons entering into the field of education on the two basic components of computers; (1) the demystification of computers, and (2) the uses of the computer.

## II. GOAL

To provide students who are majoring in education a course of study that would give them information and experiences relative to the applications of technology on the field of Education.

## III. COURSES and OBJECTIVES

### Introduction to Computers and their Applications

After completing this course the students should have an understanding of:

- *the various types of computers and parts of the computers*
- *vocabulary related to the computer and its uses*
- *functions of the related types and parts*
- *the ways computers influence society*
- *some of the areas in which research in computers is needed*
- *some of the major policy issues that need to be addressed as a society increases its use of technology*
- *the various applications of computers i.e. wordprocessing, database, spreadsheet, telecommunications, interactive video, artificial intelligence*
- *the procedures for booting a simple applications software on a microcomputer*
- *the basic steps necessary to execute a wordprocessing, database and spreadsheet program (very introductory approach)*

### Instructional Applications (CAI)

After completing the course the students should have an understanding of;

- *the various types of delivery systems available for instructional software*
- *Instructional software with a closed design for: Skill instruction, reinforcement, enrichment*

*Management of student skill data*
*Prescriptive and diagnostic*

- *Authoring software with an open design*
- *Interactive Video*
- *how to present a lesson using instructional software*
- *how to incorporate the instructional software in a systematic manner through out a school year, semester, unit of instruction, etc.*
- *how to use a word processor as a tool to instruction*
- *how to use a spreadsheet as a too to instruction*

## Management Applications (CMI)

After completing the course the students should have an understanding of;

- *the various uses for a management system in an educational setting*
- *the strategies for efficient use of the computer*
- *how to design a skills management database and reports*
- *how to design a classroom management database and reports*
- *how to merge database information from a database with narrative information for formal reporting and communications*

## In-Depth Wordprocessing Applications for Term Papers, Creative Writing and Publications

After completing the course the students should have an understanding of;

- *how to use a wordprocessor*
- *the various features of a wordprocessor*
- *the commands necessary to use all features of the selected wordprocessing program*
- *how to execute the commands necessary to use all features of the selected wordprocessing program*
- *produce a completed document through the use of the wordprocessor and selected features*

## Database

After completing the course the students should have an understanding of;

- *how to use a database*
- *the various features of a database*
- *the commands necessary to use all features of the selected database program*
- *how to execute the commands necessary to use all features of the selected database program*
- *produce a completed document through the use of the database and selected features*

## Spreadsheeting

After completing the course the students should have an understanding of;

- *how to use a database*
- *the various features of a spreadsheet*
- *the commands necessary to use all features of the selected spreadsheet program*

- *how to execute the commands necessary to use all features of the selected spreadsheet program*
- *produce a completed document through the use of the spreadsheet and selected features*

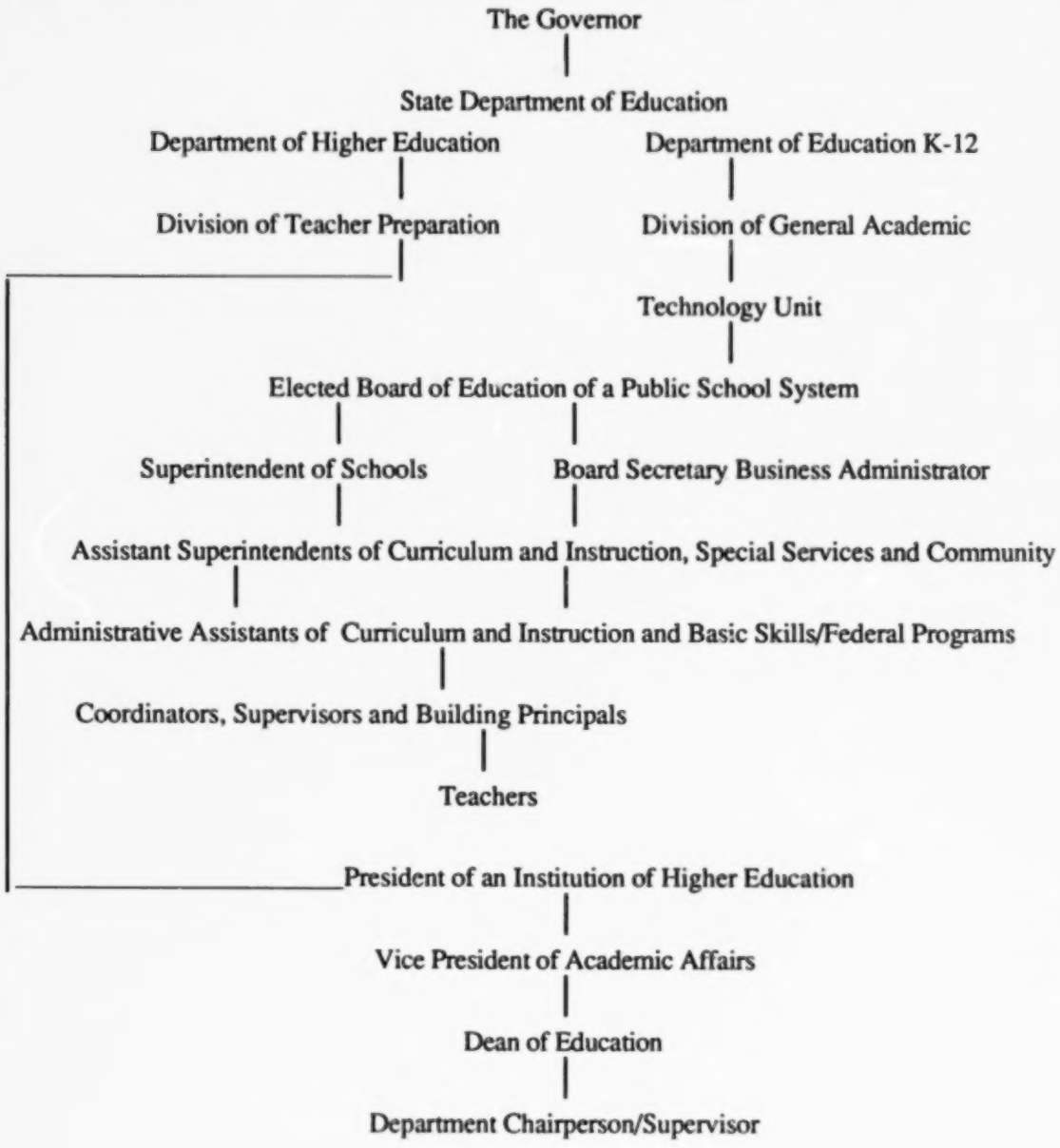
## Information Retrieval via Telecommunications and Electronic Mail

After completing the course the students should have an understanding of;

- *Retrieve data on line Telecommunications*
- *CD ROM*
- *Send and retrieve messages via electronic mail*

Appendix B

**Hierarchy Relative to the Issue of Integrating Technology into the Educational Settin**


The Governor
State Department of Education
Department of Higher Education
Department of Education K-12
Division of Teacher Preparation
Division of General Academic
Technology Unit
Elected Board of Education of a Public School System
Superintendent of Schools
Board Secretary Business Administrator
Assistant Superintendents of Curriculum and Instruction, Special Services and Community
Administrative Assistants of Curriculum and Instruction and Basic Skills/Federal Programs
Coordinators, Supervisors and Building Principals
Teachers
President of an Institution of Higher Education
Vice President of Academic Affairs
Dean of Education
Department Chairperson/Supervisor

Appendix C

Questions Referred to During Interviews

1. What is your position on the integration of technology into the educational setting?

2. On a scale of 1-10, 10 being the "most important", how crucial do you feel the integration of technology is into the educational setting for quality education.

3. On a scale of 1-10, 10 being the "most important", how crucial do you feel the integration of technology is into the educational setting for quality management of the educational system?

4. Is their a long range plan in place for the integration of technology? If yes, or if a plan is being considered what are its components?

5. Have you met your goal relative to technological integration into the instructional setting?

6. a.Has the entire staff of your district/university/state been inserviced regarding all of the applications they are expected to use?

   b.Has the inservice met their needs?

   c.How do you know this? evaluation, etc?

   d.How many hours of inservice per application were provided?

7. Do you have personnel on board to address the training and maintaining of the applications of technology?

   a. If yes, is this their full time responsibility?

   b. How many hours per week do they address responsibilities for technology?

   c. How many persons are they responsible for throughout the year?